We claim:

1.   A method in a computing device for exchanging context attributes, comprising:

receiving an invocation request to provide an attribute value, the invocation request being generated by a requesting attribute consumer, the invocation request identifying the attribute whose value is to be provided; and

in response to receiving the invocation request, providing a value for the identified attribute to the requesting attribute consumer.

2.   The method of claim 1 wherein the invocation request is a function call.

3.   The method of claim 1 wherein the invocation request is a procedure.

4.   The method of claim 1 wherein the invocation request is an invocation message.

5.   The method of claim 1 wherein a value of the identified attribute is stored, and wherein the stored value is provided to the requesting attribute consumer.

6.   The method of claim 1 wherein the identified attribute is associated with an attribute source, and wherein the method further comprises obtaining a value of the identified attribute from the attribute source with which the identified attribute is associated, and wherein the value of the attribute obtained from the attribute source with which the identified attribute is provided to the requesting attribute consumer.

7.   The method of claim 1 further comprising, in addition to providing a value for the identified attribute to the requesting attribute consumer, providing units of the value for the identified attribute.

8.   The method of claim 1 further comprising, in addition to providing a value for the identified attribute to the requesting attribute consumer, providing an uncertainty level for the identified attribute.

9.   The method of claim 1 further comprising, in addition to providing a value for the identified attribute to the requesting attribute consumer, providing a timestamp for the identified attribute.

10.   The method of claim 1 wherein the identified attribute is information reflecting an aspect of the computing device.

11.   The method of claim 10 wherein the computing device has a visual output device, and wherein the identified attribute is information about the availability of the visual output device.

12.   The method of claim 1 wherein the computing device is present in an environment, and wherein the identified attribute is information reflecting an aspect of the environment.

13.   The method of claim 12 wherein the environment has a temperature, and wherein the identified attribute is the temperature of the environment.

14.   The method of claim 1 wherein the computing device has a user, and wherein the identified attribute is information reflecting an aspect of the user.

15.   The method of claim 14 wherein the user has a blood pressure, wherein the identified attribute is the blood pressure of the user.

16. The method of claim 1 wherein one or more applications are executing on the computing device, and wherein the identified attribute is information reflecting an aspect of an executing application.

17. The method of claim 16 wherein an electronic messaging application is among the applications executing on the computing device, and wherein the identified attribute indicates whether new messages have been received by the electronic messaging application.

18. The method of claim 1 wherein the computing device is outside a selected remote environment, and wherein the identified attribute is information reflecting an aspect of the remote environment.

19. The method of claim 18 wherein the environment has a temperature, and wherein the identified attribute is the temperature of the remote environment.

20. The method of claim 1 wherein the computing device has a user, and wherein the identified attribute is information reflecting an aspect of a selected person other than the user.

21. The method of claim 20 wherein the selected person has a location, and wherein the identified attribute is the location of the selected person.

22. The method of claim 1 wherein the identified attribute is information reflecting an aspect of an identified person.

23. The method of claim 22 wherein the identified person has a temperature, and wherein the identified attribute is the temperature of the identified person.

24. The method of claim 1 wherein the invocation request further specifies a maximum age for the attribute value, and wherein the value provided to the requesting attribute consumer has an age that is no older than the specified maximum age.

25. The method of claim 1 wherein the identified attribute has a source, and wherein a value of the identified attribute previously obtained from the source of the identified attribute is cached with an indication of the age of the previously-obtained value of the identified attribute, and wherein the method further comprises, in response to receiving the invocation request:

determining whether the age of the previously-obtained value of the identified attribute exceeds the specified maximum age;

if the age of the previously-obtained value of the identified attribute does not exceed the specified maximum age, providing the previously-obtained value of the identified attribute to the requesting attribute consumer; and

if the age of the previously-obtained value of the identified attribute exceeds the specified maximum age:

obtaining a new value of the identified attribute from the source of the identified attribute, and

providing the new value of the identified attribute to the requesting attribute consumer.

26. The method of claim 34 further comprising caching the new value of the identified attribute.

27. The method of claim 1 wherein the identified attribute has a source, and wherein a value of the identified attribute previously obtained from the source of the identified attribute is cached with an indication of the age of the previously-obtained value of the identified attribute, and wherein the method further comprises, in response to receiving the invocation request:

determining whether the age of the previously-obtained value of the identified attribute exceeds the specified maximum age;

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8   if the age of the previously-obtained value of the identified attribute does not

9   exceed the specified maximum age, providing the previously-obtained value of the identified

10   attribute to the requesting attribute consumer; and

11   if the age of the previously-obtained value of the identified attribute exceeds

12   the specified maximum age:

13   obtaining a new value of the identified attribute from the source of the

14   identified attribute,

15   determining that the new value of the identified attribute exceeds the

16   specified maximum age, and

17   in response to determining that the new value of the identified attribute

18   exceeds the specified maximum age, generating an error condition indicating that the source

19   is unable to satisfy the specified maximum age.

28.   The method of claim 1 wherein a value of the identified attribute is

1   available from each of a plurality of sources, and wherein the invocation request further

2   specifies one of the plurality of sources from which a value of the identified attribute is

3   available, and wherein the value of the identified attribute provided to the requesting attribute

4   consumer is from the specified source.

29.   The method of claim 1 wherein a value of the identified attribute is

1   available from each of a plurality of sources, and wherein the invocation request further

2   specifies to provide a value of the identified attribute from each of the sources from which a

3   value of the identified attribute is available, and wherein a value of the identified attribute

4   from each of the sources from which a value of the identified attribute is available is

5   provided to the requesting attribute consumer.

30.   The method of claim 1 wherein a value of the identified attribute is

1   available from each of a plurality of sources, and wherein the value of the identified attribute

2   provided to the requesting attribute consumer is determined based upon the values of the

3   identified attribute available from the plurality of sources.

31.   The method of claim 30, further comprising caching the value of the
identified attribute provided to the requesting attribute consumer.

32.   The method of claim 1 wherein a plurality of values of the identified
attribute are available from different sources, and wherein the invocation request further
specifies to select one of the plurality of available values of the identified attribute to
provide, and wherein the value of the identified attribute provided to the requesting attribute
consumer is selected from the plurality of available values of the identified attribute.

33.   The method of claim 1 wherein a plurality of values of the identified
attribute are available from different sources, and wherein the invocation request further
specifies to determine a value of the identified attribute to provide that is based upon the
plurality of available values of the identified attribute but different than each of the plurality
of available values of the identified attribute, and wherein the value of the identified attribute
provided to the requesting attribute consumer is based upon the plurality of available values
of the identified attribute but different from each of the plurality of available values of the
identified attribute.

34.   The method of claim 1 wherein a plurality of values of the identified
attribute are available from different sources, and wherein the invocation request further
specifies to determine, from the plurality of available values of the identified attribute, one
value of the identified attribute to provide, and wherein the value of the identified attribute
provided to the requesting attribute consumer is determined from the plurality of available
values of the identified attribute.

35.   The method of claim 34 wherein the invocation request further specifies
a basis for determining, from the plurality of available values of the identified attribute, one
value of the identified attribute to provide, and wherein the value of the identified attribute
provided to the requesting attribute consumer is determined from the plurality of available
values of the identified attribute using the specified basis.

36.   The method of claim 35 wherein the invocation request further specifies
1   selecting the oldest available value of the identified attribute, and wherein the value of the
2   identified attribute provided to the requesting attribute consumer is the oldest available value
3   of the identified attribute.

37.   The method of claim 35 wherein the invocation request further specifies
1   selecting the newest available value of the identified attribute, and wherein the value of the
2   identified attribute provided to the requesting attribute consumer is the newest available
3   value of the identified attribute.

38.   The method of claim 35 wherein the available values of the identified
1   attribute are each requested and received from a different source, and wherein the invocation
2   request further specifies selecting the first-received available value of the identified attribute,
3   and wherein the value of the identified attribute provided to the requesting attribute
4   consumer is the first-received available value of the identified attribute.

39.   The method of claim 35 wherein each available value of the identified
1   attribute has an uncertainty level, and wherein the invocation request further specifies
2   selecting the available value of the identified attribute having the lowest uncertainty level,
3   and wherein the value of the identified attribute provided to the requesting attribute
4   consumer is the available value of the identified attribute having the lowest uncertainty level.

40.   The method of claim 35 wherein the invocation request further specifies
1   determining a value of the identified attribute that is the average of the available values of the
2   identified attribute, and wherein the value of the identified attribute provided to the
3   requesting attribute consumer is the average of the available values of the identified attribute.

41.   The method of claim 35 wherein each of the available values of the
1   identified attribute has an uncertainty level, and wherein the value of the identified attribute
2   provided to the requesting attribute consumer is the average of the available values of the
3   identified attribute, weighted by their uncertainty levels.

42. The method of claim 35 wherein each of the available values of the identified attribute has an age, and wherein the value of the identified attribute provided to the requesting attribute consumer is the average of the available values of the identified attribute, weighted by their ages.

43. The method of claim 35 wherein the invocation request further specifies selecting the available value of the identified attribute that occurs the largest number of times among the available values of the identified attribute, and wherein the value of the identified attribute provided to the requesting attribute consumer is the available value of the identified attribute that occurs the largest number of times among the available values of the identified attribute.

44. The method of claim 35 wherein the invocation request further specifies soliciting selection by a user of one of the available values of the identified attribute, and wherein the value of the identified attribute provided to the requesting attribute consumer is an available value of the identified attribute selected by the user.

45. The method of claim 35 wherein each available value of the identified attribute has an uncertainty level and an effective time, and wherein the invocation request further specifies selecting an available value of the identified attribute based upon a function of the uncertainty level and effective time of each, and wherein the value of the identified attribute provided to the requesting attribute consumer is selected from the available values of the identified attribute based upon the function of the uncertainty level and effective time of each.

46. The method of claim 1 wherein the invocation request is received by a context characterization module, and wherein the context characterization module has an attribute under its control, and wherein the invocation request identifies the attribute under the control of the characterization module, and wherein the attribute whose value is provided to the requesting attribute consumer is the attribute under the control of the characterization module.

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47. The method of claim 1 further comprising, before the invocation request to provide an attribute value is received, receiving from the attribute consumer an invocation request to register the attribute consumer.

48. The method of claim 47 wherein the invocation request to register an attribute consumer indicates that the requesting attribute consumer reserves an opportunity to later request provision of a value of the identified attribute, the method further comprising associating with the identified attribute an indication that the requesting attribute consumer is dependent on the identified attribute.

49. The method of claim 1 further comprising, before the invocation request to provide an attribute value is received, receiving an invocation request to register an attribute source for the identified attribute, and wherein the method further comprises obtaining a value of the identified attribute from the attribute source with which the identified attribute is associated, and wherein the value of the attribute obtained from the attribute source with which the identified attribute is provided to the requesting attribute consumer.

50. A computing device for exchanging context attributes, comprising:

an invocation request receiver that receives an invocation request to provide an attribute value, the invocation request being generated by a requesting attribute consumer, the invocation request identifying the attribute whose value is to be provided; and

an attribute value provider that provides a value for the identified attribute to the requesting attribute consumer in response to receipt of the invocation request by the invocation request receiver.

51. The computing device of claim 50 wherein the computing device is a mobile computing device.

52. The computing device of claim 50 wherein the computing device is a wearable computing device worn on the body of a human user.

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53.   The computing device of claim 50 further comprising an attribute value
memory that contains a value of the identified attribute, wherein the attribute value contained
in the attribute value memory is provided to the requesting attribute consumer by the
attribute value provider.

54.   The computing device of claim 50 wherein the identified attribute is
associated with an attribute source, the computing device further comprising an attribute
procurement subsystem that obtains a value of the identified attribute from the attribute
source with which the identified attribute is associated, and wherein the value of the attribute
obtained from the attribute source with which the identified attribute is provided to the
requesting attribute consumer by the attribute value provider.

55.   The computing device of claim 50 wherein the identified attribute has a
source, and wherein a value of the identified attribute previously obtained from the source of
the identified attribute is cached with an indication of the age of the previously-obtained
value of the identified attribute, and wherein the computing device further comprises an age
determination subsystem that determines whether the age of the previously-obtained value of
the identified attribute exceeds the specified maximum age in response to receipt of the
invocation request by the invocation request receiver, and wherein the attribute value
provider provides the previously-obtained value of the identified attribute to the requesting
attribute consumer if the age of the previously-obtained value of the identified attribute does
not exceed the specified maximum age, and obtains a new value of the identified attribute
from the source of the identified attribute and provides the new value of the identified
attribute to the requesting attribute consumer if the age of the previously-obtained value of
the identified attribute exceeds the specified maximum age.

56.   The computing device of claim 50 wherein a value of the identified
attribute is available from each of a plurality of sources, and wherein the invocation request
further specifies one of the plurality of sources from which a value of the identified attribute
is available, and wherein the value of the identified attribute provided to the requesting
attribute consumer by the attribute value provider is from the specified source.

57. The computing device of claim 50 wherein a value of the identified attribute is available from each of a plurality of sources, and wherein the invocation request further specifies to provide a value of the identified attribute from each of the sources from which a value of the identified attribute is available, and wherein a value of the identified attribute from each of the sources from which a value of the identified attribute is available is provided to the requesting attribute consumer by the attribute value provider.

58. The computing device of claim 50 wherein a value of the identified attribute is available from each of a plurality of sources, and wherein the value of the identified attribute provided to the requesting attribute consumer is determined based upon the plurality of values of the identified attribute available from different sources.

59. The computing device of claim 50 wherein a plurality of values of the identified attribute are available from different sources, and wherein the value of the identified attribute provided to the requesting attribute consumer by the attribute value provider is selected from the plurality of available values of the identified attribute.

60. The computing device of claim 50 wherein a plurality of values of the identified attribute are available from different sources, and wherein the value of the identified attribute provided to the requesting attribute consumer by the attribute value provider is based upon the plurality of available values of the identified attribute but different from each of the plurality of available values of the identified attribute.

61. A computer-readable medium whose contents cause a computing device to exchange context attributes by:

receiving an invocation request to provide an attribute value, the invocation request being generated by a requesting attribute consumer, the invocation request identifying the attribute whose value is to be provided; and

in response to receiving the invocation request, providing a value for the identified attribute to the requesting attribute consumer.

62.   A computer memory containing an invocation data structure generated
by a requesting attribute consumer, the data structure representing an invocation request to
provide an attribute value, and comprising:

an indication that the represented invocation request is a request for the
invocation of a function to provide an attribute value;

information identifying the attribute whose value is to be provided; and

information identifying a program to which the attribute value is to be
provided,

such that an attribute value provision system receiving the invocation data structure could use
its contents to provide an attribute value in accordance with the request it represents.

63.   The computer memory of claim 62 wherein the invocation data structure
is a function call stack record.

64.   The computer memory of claim 62 wherein the invocation data structure
is a function invocation message.

65.   A method in a computing device for exchanging context attributes,
comprising:

receiving an invocation request to provide a list of attributes available in the
computing device, the invocation request being generated by a requesting attribute consumer;
and

in response to receiving the invocation request, providing to the requesting
attribute consumer a list of available attributes.

66.   The method of claim 65 wherein the attributes available in the
computing device are each associated with an attribute source, and wherein the invocation
request further specifies an attribute source, and wherein the list of available attributes
provided to the requesting attribute consumer contains only those available attributes
associated with the specified attribute source.

67.   The method of claim 65 wherein each attribute available in the computing device has a name, and wherein the invocation request further specifies an attribute name pattern, and wherein the list of available attributes provided to the requesting attribute consumer contains only those available attributes whose names match the specified pattern.

68.   A computer-readable medium whose contents cause a computing device to exchange context attributes by:

receiving an invocation request to provide a list of attributes available in the computing device, the invocation request being generated by a requesting attribute consumer; and

in response to receiving the invocation request, providing to the requesting attribute consumer a list of available attributes.

69.   The computer-readable medium of claim 67 wherein the attributes available in the computing device are each associated with an attribute source, and wherein the invocation request further specifies an attribute source, and wherein the list of available attributes provided to the requesting attribute consumer contains only those available attributes associated with the specified attribute source.

70.   A computing device for exchanging context attributes, comprising:

an invocation request receiver that receives an invocation request to provide a list of attributes available in the computing device, the invocation request being generated by a requesting attribute consumer; and

an available attribute list provider that provides to the requesting attribute consumer a list of available attributes in response to receipt of the invocation request by the invocation request receiver.

71.   A computer memory containing an invocation data structure generated by a requesting attribute consumer, the data structure representing an invocation request to provide a list of available attributes, and comprising:

4   an indication that the represented invocation request is a request for the

5   invocation of a function to provide a list of available attributes; and

6   information identifying a program to which the list of available attributes is to

7   be provided

8   such that an available attribute listing system receiving the invocation data

9   structure could use its contents to provide a list of available attributes in accordance with the

10   request it represents.

        72.   The computer memory of claim 71 wherein each available attribute is

1   associated with an attribute source, and wherein the invocation request further comprises

2   information specifying an attribute source,

4   such that an available attribute listing system receiving the invocation data

5   structure could use its contents to provide a list of only those available attributes associated

6   with the specified attribute source.

        73.   A method in a computing device for exchanging context attributes,

1   comprising:

3   receiving an invocation request to register an attribute, the invocation request

4   being generated by an attribute source, the invocation request identifying the attribute to be

5   registered; and

6   in response to receiving the invocation request, generating an indication that

7   the identified attribute can be obtained from the attribute source.

        74.   The method of claim 73 wherein the invocation request further specifies

1   a manner of invoking the attribute source to obtain the identified attribute from the attribute

2   source, and wherein the generated indication that the identified attribute can be obtained

3   from the attribute source includes an indication of the specified manner of invoking the

4   attribute source to obtain the identified attribute from the attribute source.

        75.   The method of claim 74, further comprising using the indication of the

1   specified manner of invoking the attribute source included in the indication to invoke the

2   attribute source to obtain the identified attribute from the attribute source.

76.   The method of claim 75 wherein invoking the attribute source to obtain the identified attribute from the attribute source includes an identification of the attribute.

77.   The method of claim 75 wherein invoking the attribute source to obtain the identified attribute from the attribute source includes an indication of a maximum time in which the attribute source is expected to supply the identified attribute.

78.   The method of claim 75, further comprising receiving the identified attribute from the attribute source in response to invocation of the attribute source.

79.   The method of claim 78 wherein receiving the identified attribute from the attribute source includes a value of the attribute.

80.   The method of claim 79 wherein receiving the identified attribute from the attribute source includes an indication of the level of uncertainty of the value of the attribute.

81.   The method of claim 79 wherein receiving the identified attribute from the attribute source includes an indication of the time at which the value of the attribute is most accurate.

82.   The method of claim 79 wherein receiving the identified attribute from the attribute source includes an indication of the units in which the value of the attribute is expressed.

83.   The method of claim 79 wherein receiving the identified attribute from the attribute source includes an indication of the format in which the value of the attribute is expressed.

84.   The method of claim 74 further comprising:

2   receiving an invocation request to provide an attribute value, the invocation

3   request to provide an attribute value identifying the attribute identified by the invocation

4   request to register an attribute, the invocation request to provide an attribute value being

5   generated by a requesting attribute consumer; and

6   in response to receiving the invocation request to provide an attribute value:

7   using the generated indication of the specified manner of invoking the attribute

8   source to obtain the identified attribute from the attribute source to invoke the attribute

9   source to obtain the identified attribute from the attribute source, and

10   providing the attribute value obtained from the attribute source to the

11   requesting attribute consumer.

    85.   The method of claim 73, wherein the invocation request further

1   specifies a name of the attribute, and wherein the generated indication that the identified

2   attribute can be obtained from the attribute source includes an indication of the specified

3   name of the attribute.

    86.   The method of claim 73, wherein the invocation request further

1   specifies a name of the attribute source, and wherein the generated indication that the

2   identified attribute can be obtained from the attribute source includes an indication of the

3   specified name of the attribute source.

    87.   The method of claim 73, wherein the invocation request further

1   specifies a data type of the attribute, and wherein the generated indication that the identified

2   attribute can be obtained from the attribute source includes an indication of the specified data

3   type of the attribute.

    88.   The method of claim 73, wherein the invocation request further

1   specifies an indication of a format of the attribute, and wherein the generated indication that

2   the identified attribute can be obtained from the attribute source includes an indication of the

3   specified format indication of the attribute.

89.   A computer-readable medium whose contents cause a computing device
to exchange context attributes by:

receiving an invocation request to register an attribute, the invocation request
being generated by an attribute source, the invocation request identifying the attribute to be
registered; and

in response to receiving the invocation request, generating an indication that
the identified attribute can be obtained from the attribute source.

90.   The computer-readable medium of claim 89, wherein the invocation
request further specifies a manner of invoking the attribute source to obtain the identified
attribute from the attribute source, and wherein the generated indication that the identified
attribute can be obtained from the attribute source includes an indication of the specified
manner of invoking the attribute source to obtain the identified attribute from the attribute
source.

91.   The computer-readable medium of claim 90 wherein the contents of the
computer-readable medium further cause the computing device to use the indication of the
specified manner of invoking the attribute source to obtain the identified attribute from the
attribute source included in the indication that the identified attribute can be obtained from
the attribute source to invoke the attribute source to obtain the identified attribute from the
attribute source.

92.   The computer-readable medium of claim 91 wherein invoking the
attribute source to obtain the identified attribute from the attribute source includes an
identification of the attribute.

93.   The computer-readable medium of claim 90 wherein the contents of the
computer-readable medium further cause the computing device to:

receive an invocation request to provide an attribute value, the invocation
request to provide an attribute value identifying the attribute identified by the invocation

5   request to register an attribute, the invocation request to provide an attribute value being

6   generated by a requesting attribute consumer; and

7   in response to receiving the invocation request to provide an attribute value:

8   use the generated indication of the specified manner of invoking the attribute

9   source to obtain the identified attribute from the attribute source to invoke the attribute

10 source to obtain the identified attribute from the attribute source, and

11   providing the attribute value obtained from the attribute source to the

12 requesting attribute consumer.

        94.   A computer memory containing an invocation data structure generated

1 by an attribute source, the data structure representing an invocation request to register an

2 attribute, and comprising:

4   an indication that the represented invocation request is a request for the

5 invocation of a function to register an attribute;

6   information identifying the attribute to be registered; and

7   information identifying the attribute source,

8   such that the data structure may be used to obtain the registered attribute from

9 the attribute source.

        95.   The computer memory of claim 94 wherein the data structure further

1 comprises information specifying a manner of invoking the attribute source to obtain the

2 identified attribute from the attribute source,

4   such that the data structure may be used to obtain the registered attribute from

5 the attribute source by invoking the attribute source in the specified manner.

        96.   The computer memory of claim 94, wherein the data structure further

1 comprises information specifying a name of the attribute.

        97.   The computer memory of claim 94, wherein the data structure further

1 comprises information specifying a name of the attribute source.

98.   A method in a computing device for exchanging context attributes,
comprising:

receiving an invocation request to create a condition based on an attribute, the
invocation request identifying the attribute on which the condition is based, the invocation
request specifying a test to perform on the identified attribute; and

in response to receiving the invocation request, generating an indication of the
condition, the generated indication identifying the attribute identified by the invocation
request and indicating the specified test.

99.   The method of claim 98 wherein the invocation request further specifies
a name of the condition, and wherein the generated indication of the condition further
indicates the specified condition name.

100.   The method of claim 99 further comprising:

receiving an invocation request to evaluate a condition, the invocation request
to evaluate a condition being generated by a requesting condition consumer, the invocation
request to evaluate a condition specifying the condition name specified by the invocation
request to create a condition; and

in response to receiving the invocation request to evaluate a condition:

using the generated indication of the condition to evaluate the condition based
upon the attribute, and

providing to the requesting condition consumer an indication of the value of
the condition as evaluated.

101.   A method in a computing device for exchanging context attributes,
comprising:

receiving an invocation request to create a condition monitor based on a
condition, the invocation request identifying the condition on which the condition monitor is
based, the invocation request specifying a test to perform on the identified condition monitor,
the invocation request being generated by a requesting condition monitor consumer; and

7   in response to receiving the invocation request, generating an indication of the
8   condition monitor, the generated indication identifying the condition identified by the
9   invocation request and indicating the specified test.

        102.   The method of claim 100 further comprising:
2   at a time after receiving the invocation request, determining that the specified
3   test has been satisfied; and
4   in response to determining that the specified test has been satisfied, notifying
5   the requesting condition monitor consumer that the specified test has been satisfied.

        103.   The method of claim 100 wherein the invocation request further
1   specifies a frequency with which the specified test is to be evaluated, and wherein the
2   method further comprises reiteratively evaluating the specified test at substantially the
3   specified frequency to determine whether the specified test has been satisfied

        104.   The method of claim 100 wherein the identified condition may
1   transition between values of true and false, and wherein the specified test is either (1) that the
2   identified condition transitions from the value false to the value true, (2) that the identified
3   condition transitions from the value true to the value false, or (3) that the identified condition
4   transitions either from the value false to the value true or from the value true to the value
5   false.

        105.   The method of claim 100 wherein the invocation request further
1   specifies a manner of invoking the requesting condition monitor consumer to notify the
2   requesting condition monitor consumer that the specified test has been satisfied, and wherein
3   the generated indication of the condition monitor includes an indication of the specified
4   manner of invoking the requesting condition monitor consumer to notify the requesting
5   condition monitor consumer that the specified test has been satisfied.

        106.   The method of claim 100 wherein the invocation request further
1   specifies a name of the condition monitor, and wherein the generated indication of the
2   condition further indicates the specified condition monitor name.

107. The method of claim 106 further comprising:

after receiving an invocation request to create a condition monitor, receiving an invocation request to suspend the operation of a condition monitor, the invocation request to suspend the operation of the condition monitor specifying the name of the condition monitor specified by the invocation request to create a condition monitor; and

in response to receiving the invocation request to suspend the operation of a condition monitor, modifying the indication of the condition monitor to indicate that operation of the condition monitor is suspended.

108. The method of claim 107, further comprising:

after receiving an invocation request to suspend the operation of a condition monitor, receiving an invocation request to resume the operation of a condition monitor, the invocation request to resume the operation of a condition monitor specifying the name of the condition monitor specified by the invocation request to create a condition monitor; and

in response to receiving the invocation request to suspend the operation of a condition monitor, modifying the indication of the condition monitor to indicate that operation of the condition monitor is not suspended.

109. The method of claim 108, further comprising:

during the period after receiving an invocation request to create a condition monitor and before receiving an invocation request to suspend the operation of a condition monitor, periodically evaluating the specified test;

during the period after receiving an invocation request to suspend the operation of a condition monitor and before receiving an invocation request to resume the operation of a condition monitor, omitting to evaluate the specified test; and

after receiving an invocation request to resume the operation of a condition monitor, periodically evaluating the specified test.

110. A method in a computing device for exchanging context attributes, comprising:

3   receiving an invocation request to provide an indication of attribute consumers

4   that are dependent on an attribute, the invocation request identifying the attribute about

5   which an indication is to be provided, the identified attribute having a source, the invocation

6   request being generated by the source of the identified attribute;

7   in response to receiving the invocation request, providing an indication of

8   attribute consumers that are dependent on the identified attribute.

        111.   The method of claim 110 wherein the provided indication of attribute

1   consumers that are dependent on the identified attribute is the number of attribute consumers

2   that are dependent on the identified attribute.

        112.   The method of claim 110 wherein the provided indication of attribute

1   consumers that are dependent on the identified attribute is an indication of the identities of

2   attribute consumers that are dependent on the identified attribute.

        113.   A method in a computing device for exchanging context attributes,

1   comprising:

3   receiving an invocation request to launch a context server from which values of

4   one or more attributes can be obtained, the invocation request identifying the context server

5   to be launched, the invocation request being generated by a context client; and

6   in response to receiving the invocation request, launching the identified context

7   server.

        114.   A method in a computing device for exchanging context attributes,

1   comprising:

3   receiving an invocation request to provide an attribute value, the invocation

4   request being generated by a requesting attribute consumer, the invocation request

5   identifying the attribute whose value is to be provided; and

6   in response to receiving the invocation request, providing a value for the

7   identified attribute to the requesting attribute consumer.

115. One or more computer memories collectively containing an attribute
instance registration data structure reflecting a set of registered attribute instances, each
attribute instance having a source having an identity, the data structure comprising a
multiplicity of entries, each entry corresponding to a registered available attribute instance
and containing information indicating:

an attribute name for the registered attribute instance; and

the identity of the source of the registered attribute instance,

such that the data structure may be used to determine the attribute names and sources of
registered attribute instances.

116. The computer memories of claim 115 wherein a plurality of the
multiplicity of entries each contain an indication of an earlier-retrieved value of the attribute
instances to which they correspond.

117. The computer memories of claim 116 wherein the plurality of entries
each further contain an indication of a time at which the earlier-retrieved value of the
attribute instance was effective.

118. The computer memories of claim 115 wherein a plurality of the
multiplicity of entries each contain an indication of a manner of invoking the source of the
corresponding attribute instance to obtain a value for the attribute instance from the source

119. One or more computer memories collectively containing a context
attribute condition data structure, the data structure comprising a plurality of entries, each
entry corresponding to a condition based upon an attribute and containing:

information identifying the attribute upon which the condition is based; and

information specifying the test to be performed on the identified attribute in
order to evaluation the condition,

such that the data structure may be used to evaluate the conditions to which its entries
correspond.

120.   The computer memories of claim 119 wherein each entry further
1   contains an indication of a name of the corresponding condition,

3   such that the contents of the data structure may be used to evaluate a condition having a

4   particular name.

121.   One or more computer memories collectively containing a context
1   attribute condition monitor data structure, the data structure comprising a plurality of entries,

2   each entry corresponding to a condition monitor based upon condition and containing:

4   information identifying the condition upon which the condition monitor is

5   based; and

6   information specifying the test to be performed on the identified condition in

7   order to determine whether the condition monitor has been triggered,

8   such that the data structure may be used to determine whether the conditions monitors to

9   which its entries correspond have been triggered.

122.   The computer memories of claim 121 wherein each entry further
1   specifies a frequency at which the corresponding condition monitor is to be evaluated to

2   determine whether the condition monitor has been triggered,

4   such that the contents of the data structure may be used to evaluate the condition monitors to

5   which its rows correspond each at the frequency specified for it.

123.   The computer memories of claim 121 wherein each entry further
1   contains an indication of whether operation of the corresponding condition monitor is

2   suspended,

4   such that the contents of the data structure may be used to determine which of the condition

5   monitors to which its rows correspond need not be evaluated.

1   124.   The method of claim 1, further comprising the step of, in response to

2   receiving the invocation request, providing a name and a value of a property associated with

3   the identified attribute to the requesting attribute consumer.

1   125. The method of claim 6, furthering comprising obtaining a value of a

2 property associated with the identified attribute from the attribute source with which the

3 identified attribute is associated.

1   126. The method of claim 125, furthering comprising providing the obtained

2 associated property value to the requesting attribute consumer.

1   127. The method of claim 125, wherein the obtained property is security

2 information associated with the identified attribute, further comprising using the security

3 information to determine whether to provide a value for the identified attribute to the

4 requesting attribute consumer.

1   128. The computer memories of claim 116 wherein a selected entry contains

2 information indicating a value of a property associated with the attribute instance to which

3 the entry corresponds.

1   129. The computer memories of claim 128 wherein the selected entry

2 contains information indicating a name of the property associated with the attribute instance

3 to which the selected entry corresponds.

1   130. The computer memories of claim 128 wherein the property value

2 constitutes security information associated with the attribute instance to which the selected

3 entry corresponds,

4 such that the data structure may be used to determine whether to provide a value of the

5 attribute instance to which the selected row corresponds to a particular attribute consumer.

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